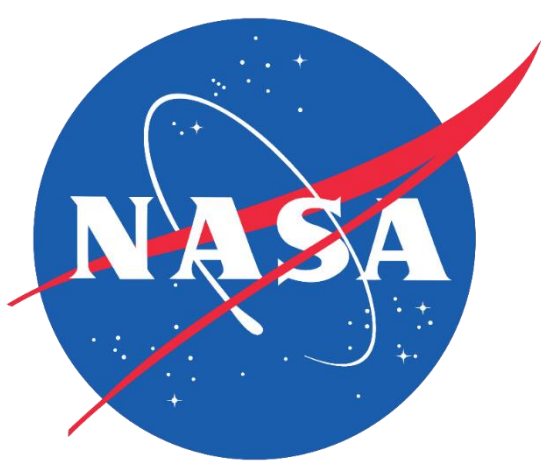




# Assessing Change in Aspen Extent in Northern Yellowstone National Park



1 Wolves were extirpated from Yellowstone National Park in the 1900s.

2 The elk population increased and browsed on aspen more.



3 As a result, most aspen in the park are mature stands without juveniles.

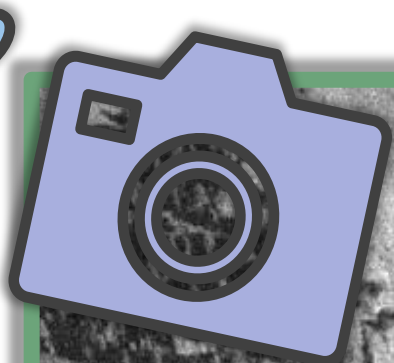
4 Wolves were reintroduced in the 1990s.

5 The elk population decreased, and their browsing behavior changed.

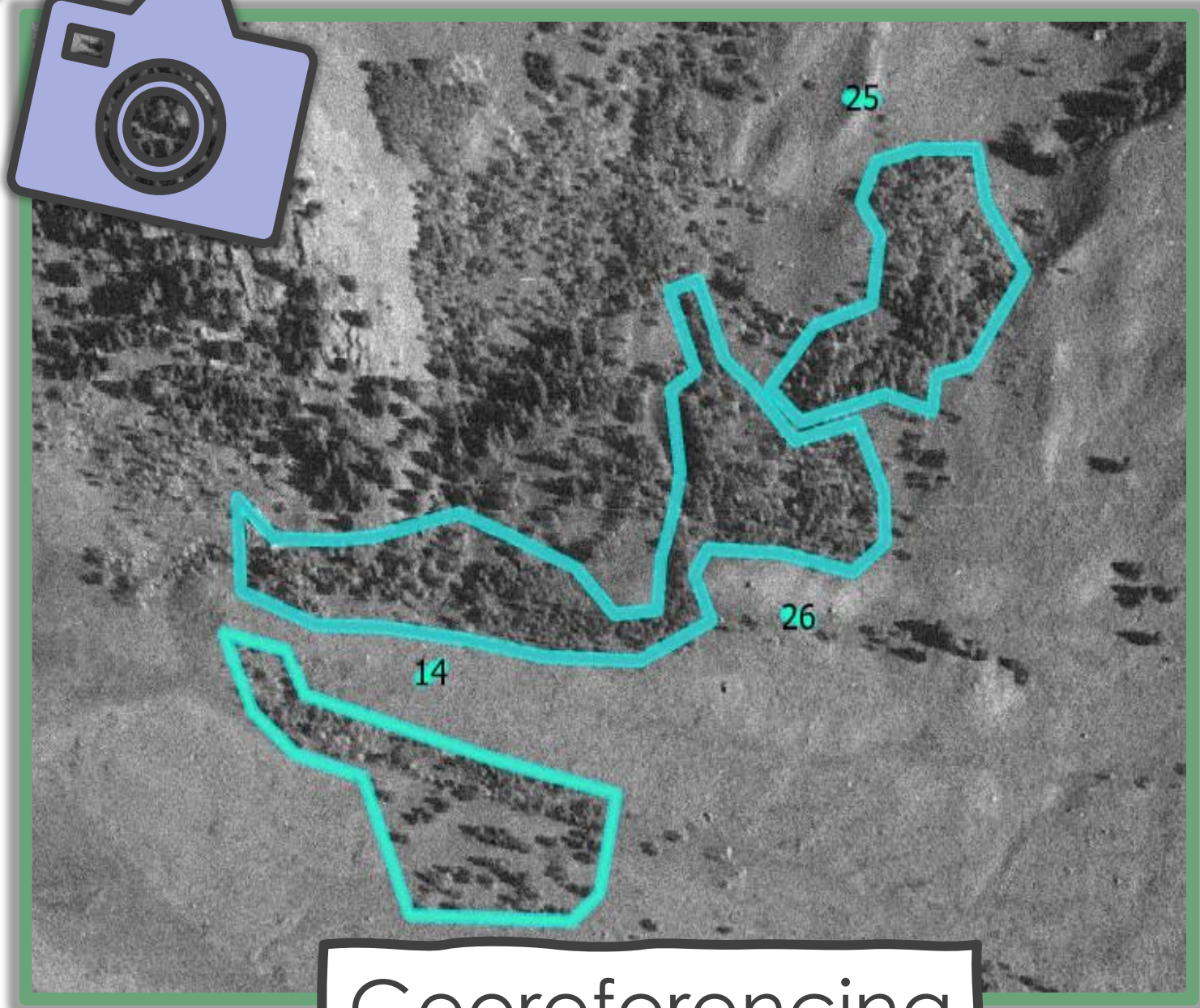
Are **aspens** recovering following **wolf** reintroduction in **Yellowstone**?



Aerial Imagery



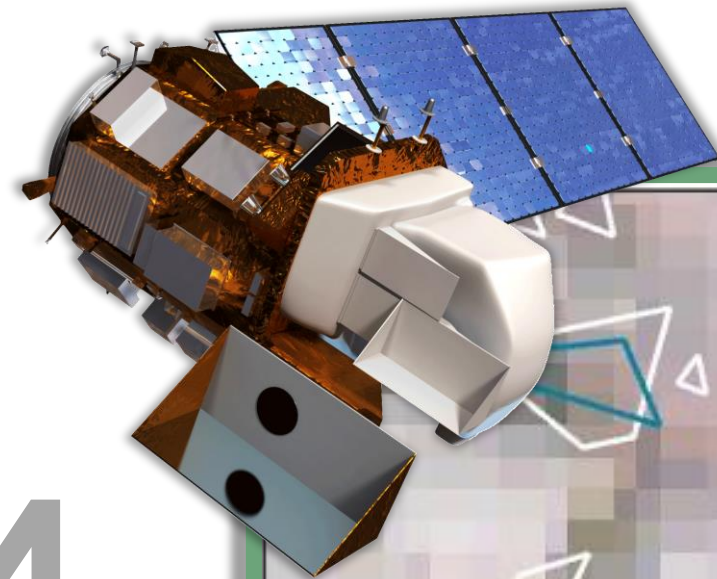
1954



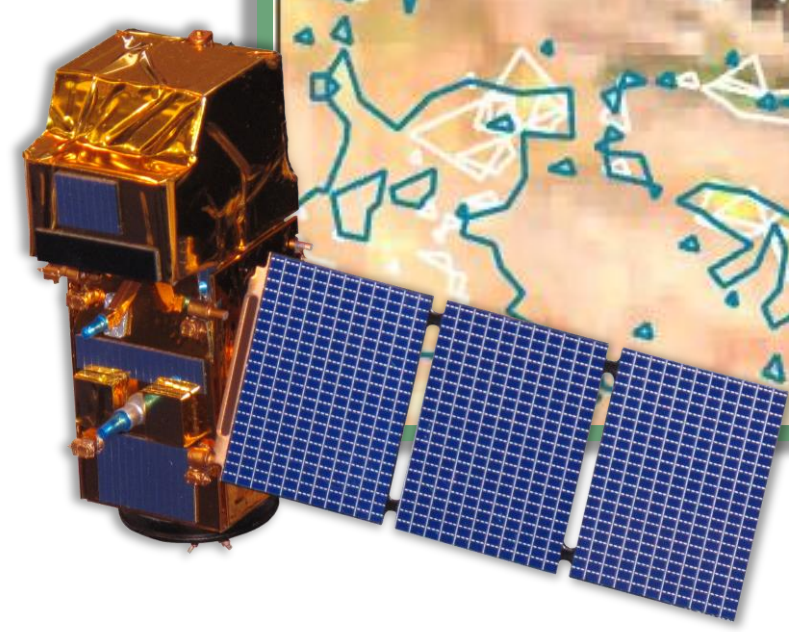
Georeferencing & Digitization

Landsat 8 OLI

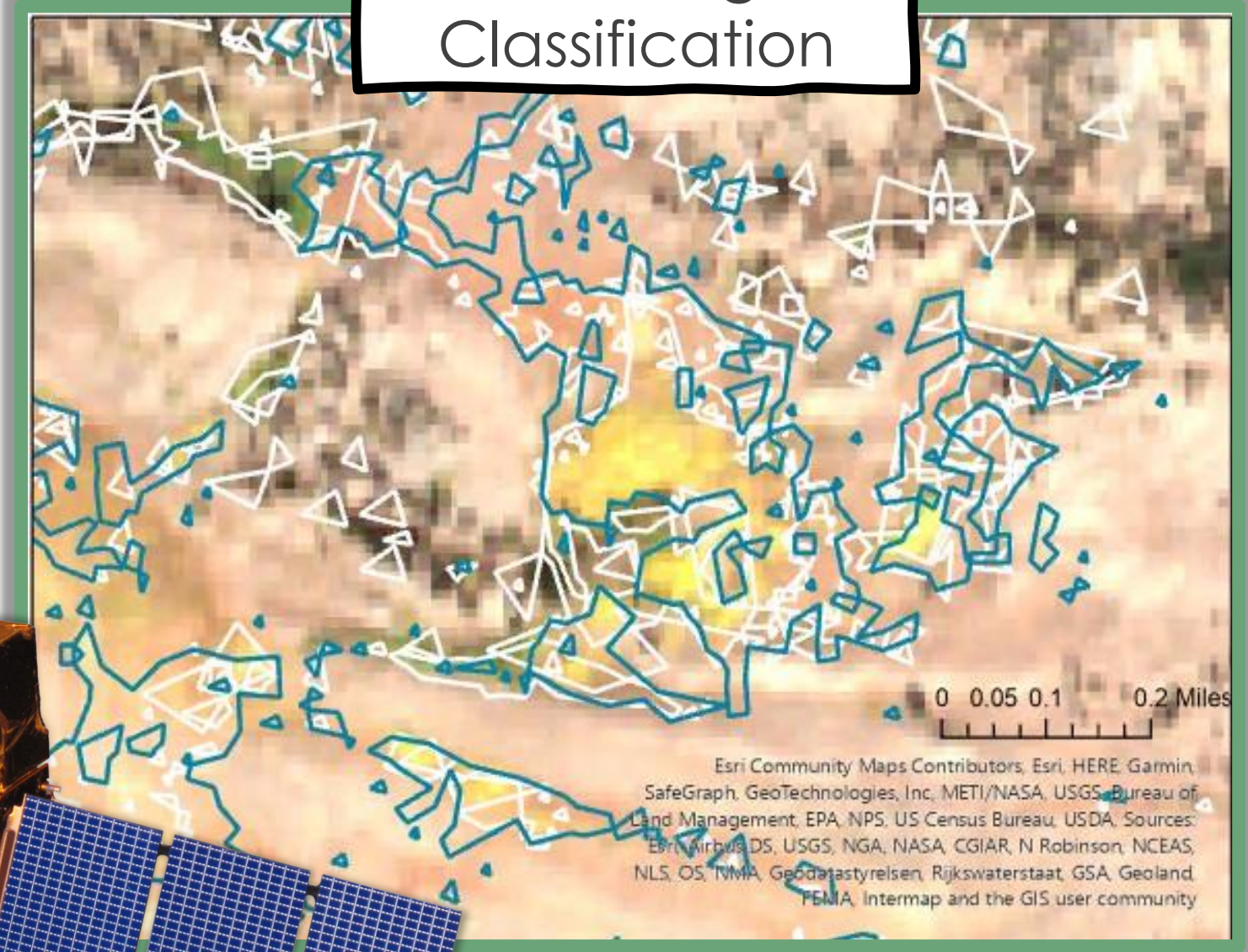
2021



Random Forest & Phenological Classification



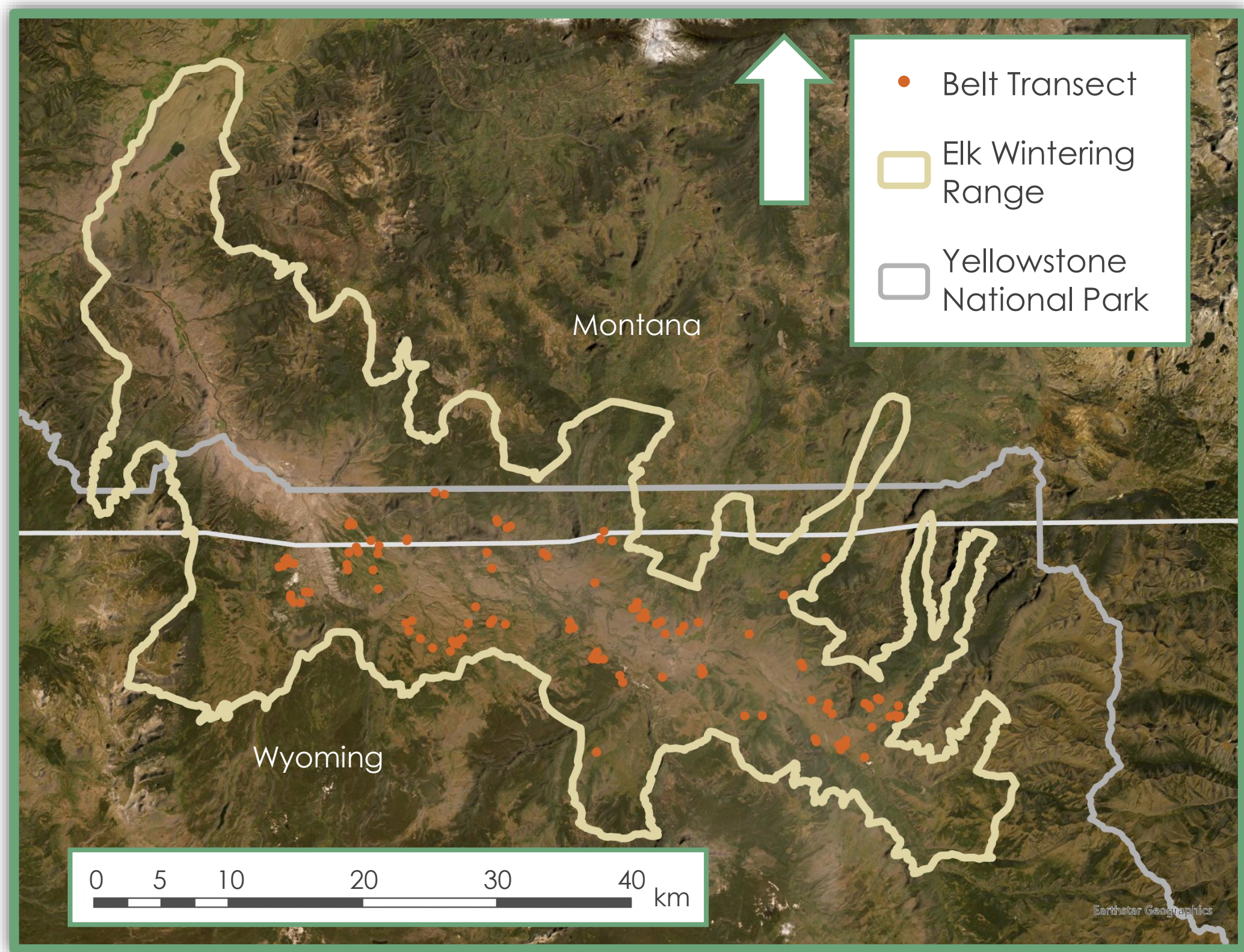
Sentinel-2 MSI



Legend

Phenology  
Random Forest

“**NASA DEVELOP** has supported **Yellowstone's efforts** to better understand the **complex story of wolves, elk, and aspen.**”  
—Dr. Daniel Stahler,  
Yellowstone National Park



Aspen within 113 stands **generally declined** between 1954 and 2021, suggesting that **aspens are not yet recovering** in Yellowstone.

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Yellowstone Ecological Forecasting II